LIQUID FUEL OIL WARMING DEVICE

FIELD OF THE INVENTION

The present invention is related to a liquid fuel oil warming device, particularly to a liquid fuel oil warming device of environment protection with safety, efficiency increasing, and fuel saving, by means of a low-pressure fanning means cooperating with appropriate fuel oil and a constant-temperature means.

BACKGROUND

In the past, for a general combustion warmer, such as gas warmer, vapor warmer, used in the residential or commercial place, it is operated essentially by filling a high-pressure steel bottle with high-pressure liquefied gas fuel, and then directing vaporized gas with reduced pressure to the gas warmer through the tube and the opening of the steel bottle, in order for ignition. Alternatively, it is operated by pumping high-pressure air, via an air compressor, into a vessel having liquid fuel oil contained therein, for impelling the liquid fuel to spray, as directed by the tube, and then mix with air for ignition, or by heating the tube so as to vaporize liquid fuel oil, and then igniting for combustion. Thus, the effect of warming may be achieved.

Although much convenience has been provided for human being by the above combustion warmer, the dangerous explosion of a high-pressure vessel (Generally, a pressure greater than 800 lb/m^2 is required.), needed to be used with the combustion warmer, is liable to occur, due to an improper operation, abruptly change in ambient temperature, collision, or other accidents. It is apt for the vaporized gas, nature gas, and liquid fuel to accumulate concentration locally when leakage occurs with carelessness, because the specific weight of them is greater than that of air. As such, once the spark or high-temperature object appears, the disaster, such as gas explosion and fire accident, will be incurred.

Moreover, the state of incomplete combustion is liable to be established, owing to a higher content of sulfur and nitrogen in these fuel, as well as uneven mixture of high-pressure exit vapor with air. In this case, firstly, the efficiency of energy conversion thereof is poor, resulting in wasting energy; and secondly, it is liable for the incomplete combustion to generate toxic gas, such as sulfur oxide and carbon monoxide, thus harmful to human life.

For the purpose of preventing these potential factors of hazard, rescuing disasters that have been occurred, as well as comforting visible and invisible scars resulted from disasters, significant cost must be paid for all of them unknowingly by the whole society and considered as a serious burden.

SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide a liquid fuel warming device of environment protection, essentially providing a fuel oil conversion cylinder, having a fuel oil body contained therein, used with a high-temperature means and a low-pressure fanning means, such that the fuel oil could be vaporized at low temperature-low pressure for eliminating the danger of gas explosion.

It is a secondary object of the present invention to provide a liquid fuel warming device of environment protection, the fanning means thereof being equipped with a check valve for the prevention of an adverse flow a well as a consequent spill of air, fuel oil, and oil vapor.

It is another object of the present invention to provide a liquid fuel warming device of environment protection, essentially providing a temperature controller and a constant-temperature rod allowed for deeply penetrating into the fuel oil body, such that a suitable temperature of the fuel oil for facilitating the generation of oil vapor may be maintained.

It is still another object of the present invention to provide a liquid fuel warming device of environment protection, in which the fuel oil body may include a common solvent, n-Hexane, and an interface active agent, for preventing the accumulation of moisture, which would otherwise degrade the quality of fuel oil.

It is yet another object of the present invention to provide a liquid fuel warming device of environment protection, the oil vapor generated by which may be ignited by the warming burner to warm, for saving energy, increasing efficiency, as well as guaranteeing safety when these devices are operated.

For the purpose of achieving aforementioned and other objects, the present invention provides a liquid fuel oil warming device of environment protection, the main structure thereof comprising a fuel oil conversion cylinder containing a fuel oil body therein, and provided with a fuel oil filling port used for adding fuel oil, a constant-temperature means, and a fanning means used for feeding air into the fuel oil conversion cylinder beneficial for generating oil vapor containing fuel oil and then for outputting the oil vapor from the fuel oil conversion cylinder; a vapor transportation pipe, one end of which is connected to the fuel oil conversion cylinder for delivering fuel vapor; and a warming burner fixed on the conversion cylinder for burning oil vapor received from the vapor transportation pipe to warm. As cooperating with the low-pressure fanning means further, oil vapor to be burned may be effectively generated at the state of low temperature-low pressure, resulting in saving fuel, increasing efficiency, and avoiding the danger of gas explosion.

BRIEF DESCRIPTION OF DRAWINGS

Fig. 1 is a perspective view according to one embodiment of the present invention;

Fig. 2 is a schematic cross-section view of a fuel oil conversion cylinder according to the present invention; and

Fig. 3 is an exploded perspective view of a warming burner according to the present invention.

DETAILED DESCRIPTION

The structural features and the effects to be achieved may further be understood and appreciated by reference to the presently preferred embodiments together with the detailed description.

Firstly, referring to Figs. 1, 2, and 3, there are shown a perspective view according to one embodiment of the present invention, a cross-section view of a fuel oil conversion cylinder, and an exploded perspective view of a warming burner, respectively. As illustrated in these figures, the main structure of a fuel oil warming device of the present invention comprises a fuel oil conversion cylinder 10, a vapor transportation pipe 145, and a warming burner 20. In which, the fuel oil conversion cylinder 10 is essentially presented as a cylinder containing a fuel oil body 30 therein. The top end of the fuel oil conversion cylinder is provided with a fuel oil filling port 16, a fanning means, a constant-temperature means, and a vapor outlet valve 14, as well as additionally equipped with a upper housing 103 covering over the fuel oil conversion cylinder 10 for protecting the structure and elements thereof.

In which, the fuel oil filling port 16 may be used for adding fuel oil timely for avoiding the depletion of oil fuel. The fanning means essentially includes a low-pressure fanning motor 125 and a pressure-controlling switch 127. The low-pressure fanning motor 125 is used for blowing air into the interior of cylinder, through a fanning pipe 123 extended to the bottom of the cylinder. A check valve 121 is further provided between the fanning pipe 123 and the fanning motor 125, for preventing air, fuel air, and even oil vapor to flow adversely toward the fanning means along the fanning pipe 123. The pressure-controlling switch 127 is allowed for controlling the operation of the fanning motor 125 for preventing the accumulation of pressure inside the cylinder, and thus the factor of possibly leading to danger may be eliminated. The constant-temperature means may include a temperature controller 183, and a constant-temperature rod 181 equally penetrating deeply into the fuel oil body 30 to extend toward the bottom of the cylinder. Moreover, there further comprises a battery 15 in the fanning means for saving and supplying electric power required for the fanning motor 125.

The main structure of a warming burner comprises a supporting stand 22, a burner head 26, a meshed cover 243, and an reflecting cover 245. In this embodiment, the supporting stand 22 is fixed on the upper housing 103 of the fuel oil conversion cylinder 10 via a fixed base 223. A check valve 221 is further provided in place at the upper section of the supporting stand 22, while the vapor transportation pipe 145 is connected to the check valve 221 from the top of the upper housing 103 through the interior of the supporting stand 22.

The structure of the burner head 26 comprises a vapor inlet 261 and a disk-shaped structure 263, the side of the disk-shaped structure 263 being provided with a plurality of fire outlets 265.

The burner head 26 may be installed on the supporting stand 22 in such a way that the vapor inlet 261 could be connected to the check valve 221. After adjusted by the check valve 221, the flow of oil vapor may enter into the burner head 26 through the vapor inlet 261, subsequently reach the disk-shaped structure 263, and finally escaped from the fire outlet 265. In this case, once the oil vapor escaped from the fire outlet 265 is ignited, the burning and the consequent warming may be thus achieved.

The warming burner 20 may be further provided with a bracket 241 at the top end of the supporting stand 22. The meshed cover 243 may be mounted around the periphery of the burner head 26 by means of the bracket 241. In this manner, the danger of firing resulted from the approach of miscellaneous objects toward the burner head may be prevented, and a certain degree of protection for the interior structure of the burner 20 may be effected. Moreover, an additional reflecting cover 245 may be further provided at the top of the meshed cover 243 in order to reflect hot air and heat radiation generated by the burner head for the enhancement of the whole effect of warming.

In the operation of the fuel oil conversion cylinder according to the present invention, after filled with fuel oil 30, the fuel body 30 is heated by the constant-temperature rod 181 and an appropriate temperature (for instance, a vaporization temperature, or a temperature a little lower than the vaporization temperature) is then maintained by the temperature controller 183, in order to avoid a reduced temperature of fuel oil, which would otherwise degrade efficiency, resulted from vaporization. The fanning means may blow air into the interior of the cylinder through the fanning pipe 123 at a low pressure. Except for slightly increasing the pressure inside the cylinder for facilitating the discharge of oil vapor, such a fanning operation is provided for further facilitating the effect of vaporization of the fuel oil body 30, since the fanning outlet is resided below the liquid level of the fuel body 30.

A vapor space 101, not occupied by the fuel oil body 30, within the interior of the cylinder will be filled with the combustible oil vapor after part of the fuel oil body

30 is vaporized. The pressure inside the cylinder could be controlled, by the pressure-controlling switch 127 in the fanning means, to slightly higher than external atmosphere, in such a way that the oil vapor may be escaped through the vapor outlet valve 14 and directed into the warming burner 20 via the vapor transportation pipe 145, only opening the vapor outlet valve 14 is required. As such, the warming resulted from burning is obtained.

Moreover, for the fuel oil warming device of the present invention, the fuel oil body 30 is selectively composed of common solvent as host, and such a host is mixed with certain amount of n-Hexane, perfume selected differently depending on individual like, and a small amount of interface active agent allowing for mutually dissolving water with fuel oil. The vaporization temperature of the overall fuel oil may be reduced in case the certain amount of n-Hexane is added to the common solvent. The vaporization temperature of the fuel oil in this present invention is approximate to 30℃ under room temperature-room pressure. Further cooperating with the fuel oil conversion cylinder 10 of the present invention, the best condition of the system performance may be obtained when the constant-temperature means is set such that the temperature of the fuel oil body 30 is maintained at a constant value of 30℃, and the pressure-controlling switch 127 in this fanning means is also set such that the pressure inside the cylinder is maintained between 0.03 to 0.06 kg/m^2.

The oil vapor, generated on the basis of aforementioned components of fuel oil and device settings, is liable to be escaped and consequently diluted by air after contacted with air, since the weight of such oil vapor is lighter than that of air. Thus, the accumulation of oil vapor will never occur. By means of experiment, it is verified that, in the general residential environment, the oil vapor released from the burner head may be diluted by air to a incombustible state at a position far away from the burner head by more than 1 centimeter. Thereby, the danger of gas explosion, resulted from the conventional use of gas or nature gas, may still not turn up, even though a great amount of oil vapor leaks out for a long time. Moreover, a full combustion for the components of oil vapor may be completed after ignited within a range of 1 centimeter spacing from the burner head, also due to the fact that the oil vapor and air may be fully blended together easily. In this manner, the efficiency of energy conversion may be extremely high, and a high-temperature heat source of 400℃ around the burner head may be formed for warming, resulting in saving energy without toxic gases generated from incomplete combustion. Whereby, it is truly a great fortune to the industry as well as environment ecological protection.

Further, the moisture impurity contained in fuel oil or the vapor entering into the cylinder with air when fanning may be combined with fuel oil, caused by the addition of interface active agent used for mutually dissolving water with fuel oil into

the fuel oil body 30, for generating oil vapor to be burned altogether and thus vaporized, without continuously accumulating in the cylinder to degrade the quality of fuel oil. The odor of added perfume may be selected differently depending on individual like for providing more delight except for general purpose. Additionally, the components of the fuel body 30 according to the present invention are all uncontrolled chemical substance, where the content of sulfur may be less than 5 ppm, and that of nitrogen may be less than 2 ppm (referring to Appendix 1 of an oil analysis report issued by Refining & Manufacturing Research Institution, Chinese Petroleum Corporation), both of them being for lower than that in common petrochemical fuel. When burning, the generation of pernicious gases such as sulfur oxide and nitrogen oxide, as examples, is thus reduced.

Finally, the warming burner 20 of the present invention may be further designed as separate form, i.e., standing on the ground or tabletop directly by means of supporting stand 22, to be moved easily by the user.

To sum up, the present invention is related to a liquid fuel oil warming device, particularly to a liquid fuel oil warming device of environment protection with safety guaranteeing, efficiency increasing, and fuel saving, essentially for obtaining the effect of fuel saving, efficiency increasing, gas explosion prevention, and other safety guaranteeing, by means of a low-pressure fanning means cooperating with appropriate fuel oil and a constant-temperature means. The foregoing description is merely one embodiment of present invention and not considered as restrictive. All equivalent variations and modifications in process, method, feature, and spirit in accordance with the appended claims may be made without in any way from the scope of the invention.

LIST OF REFERENCE SYMBOLS

10	fuel oil conversion cylinder
101	vapor space
103	upper housing
121	check valve
123	fanning pipe
125	fanning motor
127	pressure-controlling switch
14	vapor outlet valve
145	vapor transportation pipe
15	battery
16	fuel oil filling port
181	constant-temperature rod

183	temperature controller
20	warming burner
22	supporting stand
221	check valve
223	fixed base
241	bracket
243	meshed cover
245	reflecting cover
26	burner head
261	vapor inlet
263	disk-shaped structure
265	fire outlet